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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/897,839 07/21/97 NISHIMOTO Y

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MM32/0203

EXAMINER

EATON, K

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 02/03/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 08/897,839	Applicant(s) NISHIMOTO ET AL.	
	Examiner Kurt M Eaton	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1) ☒ Responsive to communication(s) filed on 17 November 1999.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 33-40 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 33-40 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some c) ☐ None of the CERTIFIED copies of the priority documents have been:

1. ☐ received.

2. ☐ received in Application No. (Series Code / Serial Number) _____.

3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

14) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 15) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 16) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>9 and 11</u> .	17) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ 18) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 19) <input type="checkbox"/> Other: _____
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DETAILED ACTION

Continued Prosecution Application

1. The request filed on 11/17/99 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 08/897,839 is acceptable and a CPA has been established. An action on the CPA follows.

Specification

2. The specification is objected to because of the following informalities: All references to the units of stress should be set forth as units of force per unit area. Appropriate correction is required.

Claim Objections

3. Claim 40 is objected to because of the following informalities: stress is measured as a force per unit area and, as such, the stress for the whole of the plurality of insulating layers should be measured in dynes/cm² and not in dynes/cm. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 2-4, 6, 8-14, 16, 17, and 19-32 have been canceled, new claims 33-40 have been added.
6. Claims 33-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al..

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Matsuura et al. (herein referred to as Matsuura) shows, in an analogous art related to improvements in a semiconductor device including an interlayer insulating film mutually insulating a first layer and a second layer of conductor patterns, in Figures 1A-1E, 5A, and 5B forming a first aluminum conductive interconnection layer (12) over a substrate; forming a first compression stressed insulating layer over and in contact with the first aluminum conductive interconnection layer; forming a first tension stressed insulating layer over and in contact with the first compression stressed insulating layer; and forming a second compression stressed insulating layer over and in contact with the first tension stressed insulating layer, wherein the compression stressed insulating layers provide resistance caused by crack propagation to the device. Matsuura also teaches that the compression stressed insulating layers are formed by plasma CVD and that the tension stressed insulating layer is formed by heating a gaseous mixture including an organic silane and oxygen {column 1, lines 21-32; column 4, line 62 – column 5, line 7; column 6, lines 35-39, line 62 – column 7, line 15}.

Matsuura does not show wherein the aluminum conductive interconnection layer is sandwiched between and in contact with the insulating films stressed compressively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an aluminum conductive interconnection layer such that it would be sandwiched between and in contact with the insulating films stressed compressively since this would require duplication of essential working steps of forming a second aluminum conductive interconnection layer over and in contact with the second compression stressed insulating layer, forming a third compression stressed insulation layer over and in contact with the second aluminum conductive interconnection layer, forming a second tension stressed insulating layer over and in contact with the

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third compression stressed layer, and forming a fourth compression stressed insulating layer over and in contact with the second tension stressed insulating layer. Mere duplication of essential working steps of a process involves only routine skill in the art.

7. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura as applied to claim 37 above, and further in view of Harriott.

Matsuura substantially discloses the invention as claimed but fails to show wherein an overall stress for the whole of all of the insulating layer is less than 3×10^5 dyne/cm².

Harriott shows in the abstract that a laminated insulating film made of individual laminae stressed in either tension or compression can be made to exhibit a stress of -50 MPa (compression) to +50 MPa (tension). Harriott also shows that the thicknesses of the individual insulating layers in the laminate contributes to the overall stress in the laminate {column 3, lines 11-13, 25-30}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the compressive stressed and tension stressed insulating layers of Matsuura such that they have an overall stress less than $+3 \times 10^5$ dyne/cm² as suggested by Harriott in order to avoid problems associated with laminate delamination and to ensure a reliable device.

Response to Arguments

8. Applicant's arguments with respect to claims 33-40 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

9. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is (703) 308-7722 or -7724. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at (703) 305-0383 and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via kurt.eaton@uspto.gov.



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